BY ORDER OF THE SECRETARY OF THE AIR FORCE

AIR FORCE INSTRUCTION 63-145

30 SEPTEMBER 2016

Acquisition

MANUFACTURING AND QUALITY MANAGEMENT

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

ACCESSIBILITY: Publications and forms are available on the e-Publishing website at **www.e-Publishing.af.mil** for downloading or ordering.

RELEASABILITY: There are no releasability restrictions on this publication.

OPR: SAF/AQRE

Certified by: SAF/AQR (Dr. David E. Walker)

Supersedes: AFI63-501, 31 May 1994

Pages: 16

This publication implements Air Force Policy Directive (AFPD) 63-1/20-1, *Integrated Life Cycle Management*, Department of Defense (DoD) Directive 5000.01, *The Defense Acquisition System*, DoD Instruction 5000.02, *Operation of the Defense Acquisition System.* It complements the manufacturing and quality directive guidance in Air Force Instruction (AFI) 63-101/20-101, *Integrated Life Cycle Management*, by providing direction for program offices and implementing commands to execute manufacturing and quality management activities during the development, acquisition, production, modification, and sustainment of AF weapon systems. This publication may be supplemented at any level, but to ensure standardization, any organization supplementing this instruction must send the implementing publication to Deputy Assistant Secretary of the Air Force for Acquisition Integration (SAF/AQX) for review and coordination before publishing. This publication applies to all military and civilian AF personnel including major commands (MAJCOM), direct reporting units (DRU) and field operating agencies (FOA), and to other individuals or organizations as required by binding agreement or obligation with the Department of the Air Force (DAF). It does not apply to the Air National Guard or the Air Force Reserve.

The authorities to waive wing/unit level requirements in this publication are identified with a Tier ("T-0, T-1, T-2, T-3") number following the compliance statement. See AFI 33-360, *Publications and Forms Management*, Table 1.1, for a description of the authorities associated with the Tier numbers. In accordance with the acquisition chain of authority specified in AFI 63-101/20-101, mandates to the acquisition execution chain are not considered Wing level mandates and tiering does not apply. All other unmarked mandates in this publication are treated as T-1. Submit requests for waivers through the chain of command to the publication OPR.

Refer recommended changes and questions about this publication to SAF/AQRE using the AF Form 847, *Recommendation for Change of Publication.* Route AF Form 847s from the field through MAJCOM publications/forms managers. Forward all comments regarding this AFI to: **usaf.pentagon.saf-aq.mbx.saf-aqre-workflow@mail.mil.** Ensure all records created as a result of the processes prescribed in this publication are maintained in accordance with (IAW) Air Force Manual (AFMAN) 33-363, *Management of Records,* and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) in the Air Force Records Information Management System (AFRIMS).

SUMMARY OF CHANGES

This document has been substantially revised and requires a complete review. It has been updated to align with the current life cycle management framework and new AF organization titles. It provides guidance for program offices to use SAE AS6500, *Manufacturing Management Program.* It also requires programs to have contractor quality management systems that are compliant with one of the commonly-used industry quality management standards. For assessments of manufacturing maturity, this document requires the use of manufacturing readiness levels (MRL) as described in the *DoD Manufacturing Readiness Level Deskbook.*

1. Overview.

1.1. Applicability. This instruction contains the directive processes and procedures required for execution of lifecycle manufacturing and quality management activities. It is applicable to all programs covered by DoDI 5000.02 and AFI 63-101/20-101. Logistics readiness, maintenance, and materiel management quality assurance is covered by 20-, 21-, and 23-series AF policy and guidance documents. Contracting quality assurance policy is covered by the Federal Acquisition Regulation (FAR) and its supplements.

1.2. Scope. The AF program execution chain, consisting of the Service Acquisition Executive (SAF/AQ), Program Executive Officers (PEO), and program managers (PM), is responsible for assuring the manufacturability and quality of assigned products. PMs are primarily responsible for the execution of the manufacturing and quality management tasks in this instruction. The PM relies on the Product Support Manager, the Lead Systems Engineer, contracting, and quality assurance personnel to accomplish manufacturing and quality management tasks. These positions are supported by personnel throughout the integrated life cycle management process who are responsible for performing manufacturing and quality management functions that are inherent in their assigned duties.

1.3. Organization. This instruction is organized to identify:

1.3.1. The core manufacturing and quality management planning, contract implementation, and manufacturing assessment activities that are considered and applied iteratively throughout the program life cycle (See paragraph 3 and subparagraphs).

1.3.2. The specific tasks and emphasis areas that are typically required for each life cycle phase (See paragraph 4 and subparagraphs).

1.4. Tailoring. PMs, with Milestone Decision Authority (MDA) approval, retain the ability to tailor and streamline strategies, oversight, reviews, phases, decision levels, documentation,

regulatory requirements and information consistent with the tailoring guidance in AFI 63-101/20-101 and DoDI 5000.02. Tailoring is especially appropriate for programs that are rapidly fielding capabilities or that have a reduced level of developmental effort, for example the acquisition of commercial off-the-shelf (COTS) systems.

1.5. Compliance. Compliance "shall" and "will" statements have been reduced throughout this AFI. Consistent with AFI 33-360, "the absence of 'punitive' language in a paragraph of a publication does not mean compliance is optional, or that a military member or civilian employee cannot be disciplined for violating non-punitive requirements in a publication. All AF personnel must comply with both punitive and non-punitive mandatory guidance in publications." The AF is reducing compliance statements, or tiering them for Wing-level and below waiver authority, for all publications in order to reduce unnecessary resource tasking, funding, and/or inspection requirements.

2. Roles and Responsibilities.

2.1. Assistant Secretary of the Air Force for Acquisition (SAF/AQ) shall:

2.1.1. Function as the Headquarters Air Force (HAF) lead for manufacturing and quality management.

2.1.2. Establish Department policy and directive guidance for manufacturing and quality management activities conducted as a part of the integrated life cycle management of systems.

2.1.3. Provide advocacy through the Defense Acquisition Regulation (DAR) system for the appropriate inclusion of manufacturing and quality management requirements in contracting regulations (including representation on the DAR Quality Assurance committee).

2.2. MAJCOM Commanders shall provide feedback on product quality deficiencies through appropriate deficiency reporting systems (e.g. the Joint Deficiency Reporting System).

2.3. In addition to the responsibilities in paragraph 2.2., the Commanders of Air Force Materiel Command and Air Force Space Command (AFMC/CC and AFSPC/CC) shall:

2.3.1. Provide manufacturing and quality management technical advice and subject matter expertise to program offices.

2.3.2. Cross-feed manufacturing and quality management lessons-learned and best practices among programs and across centers.

2.3.3. Establish and maintain standard AF product deficiency reporting capabilities (e.g. Technical Order (T.O.) 00-35D-54, *USAF Deficiency Reporting, Investigation, and Resolution*) that can channel feedback from product testers, users and maintainers to program offices and allow programs to track quality conditions during operations and support (O&S).

2.4. PEOs establish processes for their assigned programs to accomplish manufacturing and quality management objectives across the portfolio.

2.5. PMs shall:

2.5.1. Assign manufacturing and quality management responsibilities to specific personnel within the program office.

2.5.2. Integrate manufacturing and quality management across the integrated product team (IPT) structure. **Note:** This does not necessarily require the establishment of specific manufacturing or quality management teams.

2.5.3. Include quality and manufacturing requirements in contracts and in appropriate agreements with other agencies, e.g., the Defense Contract Management Agency (DCMA).

2.5.4. Assess manufacturing readiness as part of program milestone decision points and major design reviews.

2.5.5. Establish manufacturing and quality metrics for the program's products and review metrics at a frequency that enables effective risk handling by the program's manufacturing and quality efforts.

3. Manufacturing and Quality Management Core Activities.

3.1. PMs apply the following manufacturing and quality management planning, contract implementation, and assessment and reporting activities iteratively throughout the life cycle.

3.1.1. Planning for Manufacturing and Quality Management. Beginning in the Materiel Solution Analysis phase, and continuing throughout the life cycle, PMs shall use the requirements in Attachment 2 to integrate planning for the program's manufacturing and quality management approach into the strategic and technical documentation that is required by DoDI 5000.02 and AFI 63-101/20-101. PMs update this planning as the program manufacturing and quality risks evolve during Technology Maturation and Risk Reduction (TMRR), Engineering and Manufacturing Development (EMD), and Production and Deployment. Use Military Handbook (MIL-HDBK)-896, *Manufacturing Management Program Guide*, as a guide in developing the program's approach to manufacturing and quality. The *DoD Manufacturing Management Guide for Program Managers* provides additional manufacturing guidance. The PM also:

3.1.2. Incorporates continuous process improvement into program manufacturing and quality planning.

3.1.3. Evaluates contractor planning documents, developed in response to the manufacturing and quality management system requirements in paragraph 3.2., to ensure that government and contractor planning evolve in tandem throughout the life cycle.

3.2. Manufacturing and Quality Management Requirements in Contracts and Contract Monitoring. PMs shall include contract quality assurance requirements IAW FAR Part 46 and Defense FAR Supplement (DFARS) 246 "Quality Assurance."

3.2.1. In addition, the PM addresses the manufacturing and quality management requirements at Attachment 3 in contracts. Alternatively, the PM can include in the Systems Engineering Plan (SEP) the program's equivalent approach for meeting the requirements or identify why the requirements do not apply to the program

3.2.2. Manufacturing and quality assurance criteria and requirements are reflected in the program's quality assurance surveillance planning, that describes how, when, where, and

by whom the Government surveys, observes, tests, samples, inspects, evaluates, or documents contractor results to determine whether the contractor has met the required standards for each inspectable item in the contract.

3.2.2.1. In addition to FAR 46.4 and DFARS 246.4, see FAR 37.6 "Performance-Based Acquisition," and DFARS 237.1, "Service Contracts-General."

3.2.2.2. If another organization is performing contract surveillance on behalf of the program office (e.g. DCMA), the program includes specific methods and criteria in surveillance and monitoring agreements.

3.3. Assessing and Reporting Manufacturing Readiness.

3.3.1. For all AF programs (with the exception of Automated Information Systems), to include modifications, PMs assess manufacturing readiness prior to the Preliminary Design Review (PDR), the Critical Design Review (CDR), Milestone C, and the Full-Rate Production (FRP) Decision Point. Programs with high manufacturing risk should monitor and assess manufacturing readiness more frequently. If system production has stopped for more than one year or if production is restarted under another manufacturer, PMs assess manufacturing readiness prior to the production restart decision. Assessments should also evaluate the readiness of contractor, DoD depot, and AF organic organizations to execute manufacturing activities during system operations and support (O&S).

3.3.1.1. The standardized DoD MRLs provide efficient and objective measures of manufacturing maturity. Programs use MRLs in their assessments of manufacturing readiness (see the *DoD Manufacturing Readiness Level Deskbook* at **http://www.dodmrl.com/**.)

3.3.1.2. The program's *Industrial Base Assessments* (required by *DoDI 5000.60*, Defense Industrial Base Assessments, and AFI 63-101/20-101) provide data that can inform manufacturing readiness assessments and can be influenced by the program manufacturing management approach.

3.3.2. The PM summarizes the results of manufacturing readiness assessments in the "Industrial Capability and Manufacturing Readiness" section of the *Acquisition Strategy.* Manufacturing risks are incorporated into the program's risk management matrix that is required by AFI 63-101/20-101 to be presented at all program reviews, to include technical reviews and Milestone decision points. The program presents a chart that summarizes the results of manufacturing readiness assessments at reviews for the Milestone C and the FRP Decision Points. For space vehicle systems, this chart is required at CDR.

4. Manufacturing and Quality Management Life Cycle Phase Tasks. In addition to the core activities in paragraph 3 that PMs apply iteratively throughout the life cycle, the following tasks and emphasis areas are required in specific life cycle phases.

4.1. Manufacturing and Quality Management during Material Solution Analysis. The PM ensures that the initial Acquisition Strategy and SEP prepared for the next life cycle phase reflect manufacturing and quality risks identified in the AoA or Concept Characterization and Technical Description (CCTD), and include the minimum required content at Attachment 2.

The PM should incorporate assessments of manufacturing capabilities and risks, if appropriate and available, to support initial technical reviews and the alternative systems reviews.

4.2. Manufacturing and Quality Management during TMRR.

4.2.1. Manufacturing Management. During TMRR, the program initiates manufacturing technology development efforts to address identified manufacturing risks. The PM accomplishes the following phase-specific activities:

4.2.1.1. Evaluate the contractor's initial manufacturing plan, developed IAW the contract's manufacturing management system requirement, and adjust program office manufacturing management activities, as required.

4.2.1.2. Perform an initial assessment of the producibility and manufacturability of key technologies and components prior to PDR (see paragraph 3.3). The assessment at this stage should be focused, at a minimum, on understanding critical manufacturing processes, the status of production scale-up efforts, and awareness of potential supply chain issues.

4.2.1.3. Evaluate the pre-Milestone B industrial base assessment (IBA) for industrial base risks, and adjust manufacturing management activities, as required.

4.2.2. Quality Management. During TMRR, the program initiates the assessment of quality assurance program risks and the development of quality metrics. The PM accomplishes the appropriate core activities required by paragraph 3, with an emphasis on evaluating the contractor's initial program-specific Quality Plan developed IAW the contract Quality Management System (QMS) requirements, and adjusting program office quality management activities, as required.

4.3. Manufacturing and Quality Management during EMD.

4.3.1. Manufacturing Management. During EMD, the program matures manufacturing capabilities in preparation for low rate initial production (LRIP). The PM accomplishes the following phase-specific manufacturing readiness assessment activities (see paragraph 3.3.) in support of CDR and Milestone C.

4.3.1.1. In support of CDR, assessments, at a minimum, consist of: a review of contractor manufacturing management plans, metrics, identified manufacturing risks and their associated handling plans, and other data required by contract; a confirmation that manufacturing processes have been demonstrated in an appropriate environment; an analysis of the industrial base capability to support production, confirming that the supply chain (including sole/single/foreign sources and obsolescence issues) is stable, adheres to security requirements, and that viable alternative sources are identified. NOTE: Consult the IBA, when available, for information on industrial base risks.

4.3.1.2. Prior to Milestone C or CDR for space vehicle systems, these assessments, at a minimum, consist of: a review of contractor manufacturing management plans, metrics, and other data required by contract; a confirmation that manufacturing processes are demonstrated to verify that process capability data meets targets; that an

effective production control system is in place; and that known producibility issues are resolved and pose no significant risk for production.

4.3.2. Quality Management. During EMD, the PM accomplishes the appropriate core activities identified in paragraph 3, with an emphasis on:

4.3.2.1. Reviewing available contractor data (e.g. audit results, trend data, problem/deficiency resolution, scrap/rework/repair status and cost, sub-tier/supplier management, updates to manufacturing risk handling efforts) to evaluate the contractor's quality program in preparation for production.

4.3.2.2. Implementing contract quality assurance monitoring and surveillance, to include the execution of Memorandums of Understanding (MOU) with outside organizations (e.g. DCMA, center, or air logistics complexes), if necessary.

4.4. Manufacturing and Quality Management during Production and Deployment.

4.4.1. Manufacturing Management. During Production and Deployment, the PM performs the appropriate iterative activities described in paragraph 3. The purpose of the pre-FRP decision point manufacturing readiness assessment, required by paragraph 3.3, is to determine whether the contractor manufacturing processes have been demonstrated to be in control. The PM reports the assessment finding(s) as a part of the reviews supporting the FRP decision.

4.4.2. Quality Management. During Production and Deployment, the PM accomplishes the appropriate core activities identified in paragraph 3, with an emphasis on:

4.4.2.1. Monitoring and reviewing production metrics and data (e.g. non-conforming materials, dispositions, failure reporting, audits, customer satisfaction, assignable causes, corrective actions, and assessments of effectiveness) to ensure that program quality goals are being met and that improvement efforts are implemented where goals are not met.

4.4.2.2. Tracking metrics related to the quality of critical components and/or parts from subcontractors.

4.5. Manufacturing and Quality Management during O&S.

4.5.1. Manufacturing Management. During O&S, the PM accomplishes the appropriate core activities identified in paragraph 3, with an emphasis on:

4.5.1.1. Assessing the capability of contractor, DoD depot, or AF organic maintenance organizations to execute new manufacturing activities during O&S as required by paragraph 3.3. Assessments, at a minimum, consist of:

4.5.1.1.1. A review of performance during operations including manufacturing management plans, metrics, and other data required by contract.

4.5.1.1.2. A finding that depot manufacturing processes are demonstrated to be in control.

4.5.1.2. Validating that industrial base capabilities and supply chains remain in place to meet Operations and Support requirements.

4.5.2. Quality Management. During O&S, the PM accomplishes the appropriate core activities identified in paragraph 3, with an emphasis on:

4.5.2.1. Validating that contractor, DoD depot, and AF organic maintenance QMSs are consistent with the program planned approach for O&S quality management.

4.5.2.2. Reviewing the performance of and outputs from deficiency reporting systems to ensure that they provide technical, engineering, and product quality feedback throughout O&S.

DARLENE J. COSTELLO
Performing the Duties of Principal Deputy
Office of the Assistant Secretary of the Air Force

(Acquisition & Logistics)

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

FAR Part 37, "Performance-Based Acquisition"

FAR Part 46, "Quality Assurance"

FAR Subpart 9.3, "First Article Testing and Approval"

CJCSI 3170.01, *Joint Capabilities Integration and Development System (JCIDS),* 23 January 2015

DoD Directive 5000.01, *The Defense Acquisition System,* 12 May 2003

DoD Instruction 5000.02, *Operation of the Defense Acquisition System,* 7 January 2015

DoD Instruction 5000.60, *Defense Industrial Base Assessments,* 18 July 2014

DoD Manufacturing Readiness Level Deskbook, October 2012*Defense Acquistion Guidebook,* 8 May 2013

DFARS 237, "Service Contracts"

DFARS 246, "Quality Assurance"

AFPD 10-9, *Lead Command Designation and Responsibilities for Weapon System*, 8 March 2007

AFPD 63-1/20-1, *Integrated Life Cycle Management,* 3 July 2012

AFI 10-601, *Operational Capability Requirements Development,* 6 November 2013

AFI 20-106 (IP), *Management of Aviation Critical Safety Items,* 25 January 2006

AFI 33-360, *Publications and Forms Management*, 25 September 2013

AFI 62-601, *USAF Airworthiness,* 11 June 2010

AFI 63-101/20-101, *Integrated Life Cycle Management,* 7 March 2013

AFMAN 33-363, *Management of Records,* 1 March 2008

T.O. 00-35D-54, *USAF Deficiency Reporting, Investigation, and Resolution,* 1 November 2011

MIL-HDBK-896, *Manufacturing Management Program Guide,* 25 August 2016

SMC-S-003, *Quality Space and Launch Requirements Addendum to SAE AS9100C*, 2015

DoD Manufacturing Management Guide for Program Managers, 16 October 2012

ISO 9000, *Quality Management Systems - Fundamentals and Vocabulary,* 2015

ISO 9001, *Quality Management Systems - Requirements,* 2015

SAE AS6500, *Manufacturing Management Program,* 13 November 2014

SAE AS9017, *Control of Aviation Critical Safety Items,* 6 November 2009

SAE AS9100, *Quality Management Systems - Requirements for Aviation, Space and Defense Organizations*, 15 January 2009

SAE AS9110, *Quality Management Systems - Requirements for Aviation Maintenance Organizations*, 26 April 2012

Adopted Forms

AF Form 847, *Recommendation for Change of Publication*

Abbreviations and Acronyms

ACAT—Acquisition Category

AFI—Air Force Instruction

AFMAN—Air Force Manual

AFMC—Air Force Materiel Command

AFRIMS—Air Force Records Information Management System

AFPD—Air Force Policy Directive

AFSPC—Air Force Space Command

AoA—Analysis of Alternatives

CCTD—Concept Characterization and echnical Description

CJCSI—Chairman of the Joint Chiefs of Staff Instruction

COTS—Commercial Off-the-Shelf

CSI—Critical Safety Items

CDR—Critical Design Review

DAF—Department of the Air Force

DAR—Defense Acquisition Regulation

DCMA—Defense Contract Management Agency

DCS—Deputy Chief of Staff

DFARS—Defense FAR Supplement

DoD—Department of Defense

DRI&R—Deficiency Reporting, Investigation, and Resolution

DRU—Direct Reporting Unit

EMD—Engineering and Manufacturing Development

FAR—Federal Acquisition Regulation

FOA—Field Operating Agency

FRP—Full-Rate Production

HAF—Headquarters Air Force

IAW—In Accordance With

IBA—Industrial Base Assessment

IMP—Integrated Master Plan

IMS—Integrated Master Schedule

IP—Interservice Publication

IPT—Integrated Product Team

ISO—International Organization for Standards

JDRS—Joint Deficiency Reporting System

LCSP—Life Cycle Sustainment Plan

LRIP—Low Rate Initial Production

MAJCOM—Major Command

MDA—Milestone Decision Authority

MIL-HDBK—Military Handbook

MOU—Memorandums of Understanding

MRL—Manufacturing Readiness Levels

OPR—Office of Primary Responsibility

O&S—Operations and Support

PDR—Preliminary Design Review

PEO—Program Executive Officer

PM—Program Manager

POC—Point of Contact

QA—Quality Assurance

QMS—Quality Management System

RDS—Records Disposition Schedule

SAE AS—Society of Automotive Engineers International Aerospace Standard

SAF—Secretary of the Air Force

SEP—Systems Engineering Plan

SMC—Space and Missile Systems Center

TMRR—Technology Maturation and Risk Reduction

T.O—Technical Order

TPM—Technical Performance Measures

Terms

Quality—The degree to which material attributes, performance features, and characteristics of a product satisfy a given need. Quality may apply to a product, process, or system and may be physical, sensory, behavioral, temporal, ergonomic, or functional.

Quality Assurance (QA)—That part of quality management focused on providing confidence that quality requirements will be fulfilled. (ISO 9000:2015 and Defense Acquisition Guidebook)

Quality Management—The coordinated activities to direct and control an organization with regard to quality policy, quality objectives, quality planning, quality control, quality assurance and quality improvement. (ISO 9000:2015)

Quality Management System—That part of the organization's management system that focuses on the achievement of results, in relation to the quality objectives, to satisfy the needs, expectations and requirements of interested parties, as appropriate. (ISO 9000:2015)

Attachment 2

MANUFACTURING AND QUALITY MANAGEMENT PLANNING REQUIREMENTS

A2.1. IAW paragraph 4.1., this attachment outlines the requirements for integrating manufacturing and quality management planning into the strategic and technical documentation required by DoDI 5000.02 and AFI 63-101/20-101.

A2.1.1. Programs, especially those with manufacturing or quality risks, should consider using focused manufacturing or quality plans (e.g. a program Quality Assurance Plan) to document and guide the program's approach.

A2.1.2. If the program develops detailed, standalone government manufacturing or quality plans, reference them in and attach them to the SEP to preserve integration with the program's overall engineering and technical approach.

A2.2. *Acquisition Strategy*. The "Industrial Capability and Manufacturing Readiness" section includes summaries of how the program uses manufacturing management and quality management systems to contribute to the minimization of cost, schedule, and performance risks throughout the product life cycle. It also briefly summarizes the results of manufacturing readiness assessments and strategies for sustaining industrial capability for the product (e.g. identification of sole/ foreign sources, product technology obsolescence, replacement of limited-life items, and regeneration options for unique manufacturing processes), if applicable.

A2.3. The *Systems Engineering Plan (SEP)*. Integrate manufacturing and quality topics and planning into the SEP.

A2.3.1. Include manufacturing and quality risks, if they have been identified, in the "Engineering and Integration Risk Management" section.

A2.3.2. Identify the program manufacturing and quality management points of contact (POC) and describe how manufacturing and quality management execution responsibilities are allocated in the program IPT structure in the "Technical Organization" section.

A2.3.3. Include manufacturing metrics in the minimum set of technical performance measures (TPM) that DoD requires in the "Technical Performance Measures and Metrics" section in order to provide quantitative insight into how the program is executing to plan.

A2.3.4. Document how the program establishes government-contractor manufacturing management and quality management systems in the "Design Considerations" section.

A2.3.4.1. Include specific manufacturing and quality contractual requirements in the "Mapping Key Design Considerations into Contracts" matrix.

A2.3.4.2. Programs placing industry or military manufacturing and quality management system standards on contract, per Attachment 3, list these standards by identification number in the matrix under "Contractual Requirements." Programs not using these standards attach a report, under "Documentation (Hotlinks)," describing how the program has implemented a customized manufacturing and quality management system that is consistent with industry standards.

A2.3.4.3. Indicate connections between manufacturing and quality management and other design considerations. For instance, manufacturing and quality management

processes directly support the issuance of military certificates of airworthiness, which certify that each delivered aircraft complies with the system's approved design (see AFI 62-601, *USAF Airworthiness*). They support similar certification processes for space vehicles and launch vehicles, as well.

A2.4. *Integrated Master Plan and Integrated Master Schedul*e (IMP/IMS). Based on the *Acquisition Strategy* and the *SEP*, include key manufacturing activities in the IMP/IMS.

A2.5. *Life-Cycle Sustainment Plan* (LCSP). Briefly describe how the program achieves quality management objectives during O&S.

A2.5.1. Identify whether the program requires contractor, DoD depot, and AF organic QMS that comply with or that are consistent with one of the following: SAE AS9100, *Quality Management Systems - Requirements for Aviation, Space and Defense Organizations;* SAE AS9110, *Quality Management Systems - Requirements for Aviation Maintenance Organizations;* ISO 9001, *Quality Management Systems;* or SMC-S-003, *Quality Space and Launch Requirements Addendum to SAE AS9100C.*

A2.5.2. Describe how the program utilizes its deficiency reporting system, required to be established IAW AFI 63-101/20-101, to provide product quality feedback during O&S. NOTE: For efficiency and interoperability, the deficiency reporting system should conform to T.O. 00-35D-54 and utilize the Joint Deficiency Reporting System (JDRS).

A2.6. *Program Protection Plan*. Describe how the program quality assurance surveillance approach can support counterfeit parts prevention.

Attachment 3

MANUFACTURING AND QUALITY MANAGEMENT CONTRACT REQUIREMENTS

A3.1. IAW paragraph 3.2.1, the program office addresses the following manufacturing and quality management requirements in contracts. Alternatively, the PM can include in the SEP the program's equivalent approach for meeting the requirements or identify why the requirements do not apply to the program.

A3.1.1. Manufacturing Management System. For programs with a manufacturing component, require contractors to have a manufacturing management system that promotes the timely development, production, modification, fielding, and sustainment of affordable products by managing manufacturing risk throughout the program life cycle. To meet this requirement, ACAT I programs include SAE AS6500, *Manufacturing Management Program,* in contracts, with tailoring appropriate to the program's needs. SAE AS6500 is the preferred approach for programs in other ACATs. NOTE: Existing contracts at the time of publication of this AFI do not have to be changed to include AS6500.

A3.1.2. Quality Management System (QMS). Require contractors to have a QMS that is compliant with one of the following industry standards: SAE AS9100, ISO 9001, or SMCS003.

A3.1.3. Manufacturing Readiness Assessments. Require contractor to support assessments of manufacturing readiness.

A3.1.4. Metrics. Specify appropriate manufacturing and quality metrics to provide insight into program development, production and sustainment. Examples include defect rate, workmanship, organic damage, and incidents of nonconformance to technical data. In the contract, identify a methodology and required frequency for reporting metrics to the program office or other government representative.

A3.1.4.1. Apply continuous process improvement methodologies to the establishment of contractor manufacturing and quality assurance goals, objectives, and measures throughout the lifecycle.

A3.1.4.2. Review metrics, statistics, and other artifacts (e.g. audit results, trend data, deficiency reporting and resolution, scrap/rework/repair status and cost, sub-tier/supplier management, etc.) and revise metrics, data collection requirements, and other guidance to contractors, suppliers, and depots when possible to reflect lessons learned and improve quality throughout the life cycle.

A3.1.5. Critical Safety Items (CSI). For aviation, space, and defense systems, require the identification and management of CSIs IAW AFI 20-106 (IP), *Management of Aviation Critical Safety Items.* Consider applying industry standard SAE AS9017, *Control of Aviation Critical Safety Items*.

A3.1.6. First Article Testing and Approval. If the contract contains requirements for First Article Testing or First Article Inspection IAW FAR Subpart 9.3 and SAE AS6500, the PM ensures that the requirements and test methods support the demonstration of product quality IAW program's quality management planning. When the PM does not require First Article Testing or Inspection, the PM should include a rationale in the TEMP or SEP.

A3.1.7. Subtier/Supplier Management. Ensure the contract specifies which manufacturing and quality management requirements the prime contractor is required to impose on its subcontracts or supplier contracts.